

Appl. No. : 09/530,512
Filed : June 26, 2000

REMARKS

In response to the final Office Action mailed January 29, 2003, Applicant has amended the application as above. No new matter is added by the amendments as discussed below. Applicant respectfully requests the entry of the amendments and reconsideration of the application in view of the amendments and the remarks set forth below.

Discussion of Claim Amendments

Claim 18 has been amended. Upon the entry of the amendments, Claims 18-29 are pending in this application. The amendments to Claim 18 are merely for clarification and do not narrow the scope of protection. Furthermore, the amendments to the claim do not introduce any new matter. Entry of the amendments is respectfully requested.

Discussion of Claim Rejections Under 35 U.S.C. § 112, ¶ 1

A. Enablement Requirement

The Examiner has rejected Claims 18-29, under 35 U.S.C. § 112, first paragraph as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Discussion of Claims 18-29

The Examiner asserts that there is no enabling disclosure that the deposition of “an intermediate substance” other than the luminescent material that “forms a liquid phase at the crystallization temperature.” Pending Claim 18 does not recite the term “other than the luminescent material” any more. Applicant also amended Claim 18 to be definite. Applicant believes that the amendments made to Claim 18 in combination with the following comments overcome the rejection under 35 U.S.C. § 112, first paragraph.

As to the intermediate substance, the specification describes that the intermediate material is deposited on a substrate (page 2, 2nd paragraph of the Summary of the Invention, lines 2-4). Further, the specification describes that the applied technology is based on chemical or physical vapor deposition, wherein a liquid phase in the deposition process is of particular importance (page 4, lines 20-22).

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In view of the disclosure in the specification and the general knowledge of the person skilled in the art of cathodoluminescent screens, Applicant respectfully submits that the specification gives sufficient guidance and teaching as to the selection of an intermediate material selected to be liquid at the crystallization temperature of the single-crystalline material of the substrate, as recited in amended Claim 18. For example, the skilled person would recognize that the intermediate material may be a thin-film (see Claim 19) of a metallic element or a metal alloy. Further, the skilled person would recognize that the intermediate material is either a low-melting point material, such as gallium, indium, tin, lead, or the like, or a material that is liquid (i.e., melted) when it interacts with another material (e.g., phosphor) in accordance with the known phase diagram of the material and, e.g., the phosphor.

Further, the intermediate material is deposited on the substrate before the crystallization (formation) of the single-crystalline columns (e.g., phosphor as a luminescent material). The intermediate material facilitates and ensures the formation of the columns on the substrate. To be effective in the formation of the columns, the material is preferably liquid because the liquid phase (droplets) "attracts" the depositing material (e.g., phosphor) and acts as a catalyst for the deposition. The droplets are formed on the substrate if the melting point of the intermediate material is lower than the crystallization temperature.

In the alternative, the liquid phase can be formed on the substrate even if the melting point of the intermediate material is higher than the crystallization temperature. This is possible if the intermediate material interacts with the substrate or with the depositing material (e.g., phosphor). This interaction forms a liquid phase in accordance with the known phase diagram of the interacting materials. As known to the skilled person, such interaction is known as "contact melting". The latter relates to Claim 20 ("contact interaction"), and to Claim 19 ("thickness...is less than 1 micrometer") because the thin film liquid layer is thermodynamically unstable and breaks out for a plurality of small droplets giving onset to the formation of the phosphor columns.

The specification, therefore, provides clear guidance and teaching to one of ordinary skill in the art to practice the invention with respect to the intermediate material. Applicant respectfully requests the Examiner to reconsider the rejection of Claim 18 with respect to the language relating to "intermediate material."

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Discussion of Claims 23-27

The Examiner asserts that there is no enabling disclosure of a non-luminescent intermediate material that contains an activator that acts as a luminescent activator.” In response, Applicant deleted the term “non-luminescent” from Claim 18. Applicant respectfully submits that Claims 23-27 are now enabled.

Discussion of Claims 24-26 and 28-29

The Examiner asserts that there is no disclosure of “regular structure” and “structure with crystallographically-symmetric character.” Applicant respectfully disagrees. According to one embodiment, “the regular structure” and “structure with crystallographically-symmetric character” are examples of the inhomogenities. *See the last paragraph of the specification at page 2.*

In view of the amended claims and the foregoing comments, Applicant respectfully submits that the present application enables one of ordinary skill in the art to make and/or use the invention. Accordingly, Applicant respectfully requests the Examiner to withdraw the rejections under 35 U.S.C. §112, first paragraph.

B. Written Description Requirement

The Examiner has rejected Claims 18-29, under 35 U.S.C. § 112, first paragraph as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art to that the inventor, at the time the application was filed, had possession of the claimed invention.

The Examiner asserts that there is no support for the limitation that the crystallization temperature is that of a single-crystalline material that is part of the substrate on which an intermediate material is deposited. Applicant respectfully disagrees.

As to the crystallization temperature, amended Claim 18 defines that the single-crystalline material has a predetermined crystallization temperature. In view of the foregoing discussion of “intermediate material,” Applicant submits that the skilled person knows that each of the

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materials used in chemical or physical vapor deposition has a specific melting point so that the material changes its phase when the temperature is reduced from above the melting point to below the melting point. That is, at the crystallization temperature, the material changes from the liquid phase to the solid phase. Therefore, Applicant respectfully requests the Examiner to reconsider the rejection of Claim 18 with respect to the crystallization temperature.

The Examiner asserts that there is no support for the limitation that the intermediate material is "non-luminescent." In reply, as discussed above, Applicant deleted the term "non-luminescent" from Claim 18.

The Examiner asserts that there is no support for the limitation to deposit an intermediate material on a substrate that comprises single-crystalline columns before depositing a luminescent material. Applicant respectfully disagrees. As discussed above, the second paragraph of the Summary of the Invention supports the above feature.

In view of the amended claims and the foregoing comments, Applicant respectfully submits that the claimed invention is described in the specification in such a way as to reasonably convey to one skilled in the art to that the inventor, at the time the application was filed, had possession of the claimed invention. Accordingly, Applicant respectfully requests the Examiner to withdraw the rejections under 35 U.S.C. §112, first paragraph.

Discussion of Claim Rejections Under 35 U.S.C. § 112, ¶ 1

The Examiner has rejected Claims 18-29, under 35 U.S.C. § 112, second paragraph as being indefinite.

The Examiner asserts that the phrase "an intermediate material ... selected to be liquid at the crystallization temperature of the single-crystalline material" is unclear. In reply, Applicant has amended the term of Claim 18 to "an intermediate material forms liquid at the crystallization temperature of the single-crystalline material." Applicant believes that Claim 18 is now definite.

In view of amended Claim 18 and the foregoing comments, Applicant respectfully submits that the claims are definite. Accordingly, Applicant respectfully requests the Examiner to withdraw the rejection under 35 U.S.C. §112, second paragraph.

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CONCLUSION

In view of Applicant's foregoing amendments and remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

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By: 

Eric M. Nelson
Registration No. 43,829
Attorney of Record
Customer No. 20,995
(619) 235-8550

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